

American College of Radiology
ACR Appropriateness Criteria®

Hydronephrosis on Prior Imaging-Unknown Cause

Variant 1: Adult. Asymptomatic unilateral hydronephrosis with unknown cause. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTU without and with IV contrast	Usually appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	7	7	0	1	0	4	1	0	7	1	1
MRU without and with IV contrast	Usually appropriate	Strong	○ ○ mSv	○ ○ mSv [ped]	7	7	0	0	0	0	1	3	8	1	2
		References		Study Quality											
		13 (31237781)		2											
		14 (25102294)		2											
MAG3 renal scan	Usually appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	7	7	0	0	1	0	1	1	7	2	3
		References		Study Quality											
		12 (8917195)		4											
		11 (24591488)		4											
		10 (25444983)		2											
CT abdomen and pelvis with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	1	0	5	3	3	0	3	0	0
MRU without IV contrast	May be appropriate	Limited	○ ○ mSv	○ ○ mSv [ped]	5	5	0	1	0	6	5	2	1	0	0
		References		Study Quality											

		15 (20729416)			4											
DTPA renal scan	May be appropriate (Disagreement)	Expert Opinion	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	5	5	1	0	1	1	9	0	3	0	0	
		References		Study Quality												
		13 (31237781)		2												
		12 (8917195)		4												
		11 (24591488)		4												
		10 (25444983)		2												
CT abdomen and pelvis without IV contrast	May be appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	4	4	0	1	1	8	5	0	0	0	0	
US color Doppler kidneys and bladder retroperitoneal	May be appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	4	4	0	0	7	3	4	1	0	0	0	
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	7	0	7	0	1	0	0	0	0	
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	5	2	5	1	0	2	0	0	0	
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	3	2	7	3	0	0	0	0	0	
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	1	1	7	2	3	1	0	0	0	
US abdomen	Usually not appropriate	Expert Consensus	○ ○ mSv	○ ○ mSv [ped]	3	3	2	2	5	1	3	1	1	0	0	
CT abdomen with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	7	3	2	0	1	1	1	0	0	
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	6	3	2	1	1	1	1	0	0	

		10 (25444983)		2											
		2 (29287975)		4											
CT abdomen and pelvis with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	0	6	3	2	2	2	0	0
CT abdomen and pelvis without IV contrast	May be appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	5	5	0	1	1	2	5	6	0	0	0
CTU without and with IV contrast	May be appropriate (Disagreement)	Expert Opinion	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	5	5	1	1	2	2	0	1	4	4	0
MRU without IV contrast	May be appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	5	5	0	1	0	3	6	5	0	0	0
		References		Study Quality											
		15 (20729416)		4											
DTPA renal scan	May be appropriate (Disagreement)	Expert Opinion	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	5	5	0	1	2	1	6	3	2	0	0
		References		Study Quality											
		13 (31237781)		2											
		12 (8917195)		4											
		11 (24591488)		4											
		10 (25444983)		2											
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	3	4	4	2	1	1	0	0	0
MRI abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	4	2	8	0	1	0	0	0	0
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	1	0	7	1	3	2	1	0	0
US abdomen	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	2	3	5	3	2	0	0	0	0

Fluoroscopy antegrade pyelography	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		3	3	4	3	4	2	1	0	1	0	0
US color Doppler kidneys and bladder retroperitoneal	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	3	3	0	0	8	2	5	0	0	0	0
CT abdomen with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	6	4	2	0	2	1	0	0	0
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	2	2	5	4	2	2	1	1	0	0	0
CT abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	2	2	7	3	2	0	1	2	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	2	2	5	5	5	0	0	0	0	0	0
Radiography intravenous urography	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	2	2	7	3	1	1	2	0	1	0	0
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☼☼ 0.1-1mSv	☼☼ 0.03-0.3 mSv [ped]	2	2	7	2	3	1	1	0	1	0	0
MRI abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	○ 0 mSv	○ 0 mSv [ped]	2	2	3	6	2	1	2	0	1	0	0
Radiography abdomen and pelvis	Usually not appropriate		☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0

Variant 3: Adult. Symptomatic hydronephrosis with unknown cause. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
CTU without and with IV contrast	Usually	Limited	☼☼☼☼ 10-30	☼☼☼☼☼	7	7	0	0	0	1	4	2	4	3	1

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
	appropriate		mSv	10-30 mSv [ped]											
		References		Study Quality											
		28 (29399012)		3											
MRU without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	0	1	0	3	3	5	2	1
		References		Study Quality											
		29 (25249333)		4											
		28 (29399012)		3											
		17 (30853305)		4											
		14 (25102294)		2											
		13 (31237781)		2											
MAG3 renal scan	Usually appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	7	7	0	0	1	0	1	2	5	4	2
		References		Study Quality											
		12 (8917195)		4											
		11 (24591488)		4											
		10 (25444983)		2											
		2 (29287975)		4											
US color Doppler kidneys and bladder retroperitoneal	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	1	0	1	0	0	4	5	1	3
		References		Study Quality											
		41 (23503878)		3											
		40 (27154825)		3											
		39 (25219987)		3											
		38 (26177650)		3											
		37 (24578772)		3											
		36 (29427476)		Good											

MRU without IV contrast	May be appropriate	Limited	0 0 mSv	0 0 mSv [ped]	5	5	0	0	0	5	3	5	2	0	0
		References		Study Quality											
		31 (23532422)		3											
		30 (23290346)		2											
		29 (25249333)		4											
		17 (30853305)		4											
		15 (20729416)		4											
DTPA renal scan	May be appropriate	Strong	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	5	5	0	1	2	1	9	2	0	0	0
		References		Study Quality											
		13 (31237781)		2											
		12 (8917195)		4											
		11 (24591488)		4											
		10 (25444983)		2											
US abdomen	May be appropriate (Disagreement)	Expert Opinion	0 0 mSv	0 0 mSv [ped]	5	5	3	5	1	1	2	2	1	0	0
MRI abdomen and pelvis without IV contrast	May be appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	4	4	1	2	4	3	4	0	1	0	0
MRI abdomen and pelvis without and with IV contrast	May be appropriate	Expert Consensus	0 0 mSv	0 0 mSv [ped]	4	4	0	1	4	3	3	3	1	0	0
CT abdomen with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	5	2	2	2	2	2	0	0	0
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	3	3	5	2	2	3	1	2	0	0	0
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Strong	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	3	3	0	2	8	1	0	3	1	0	0
		References		Study Quality											

			23 (26747219)	3												
			22 (29663580)	2												
			21 (24440589)	3												
			20 (29675722)	3												
			19 (27369294)	2												
			18 (34773812)	2												
			17 (30853305)	4												
			16 (34304393)	3												
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	3	3	4	3	4	1	1	2	0	0	0	
CT abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	⊗⊗⊗⊗ 10-30 mSv	⊗⊗⊗⊗⊗ 10-30 mSv [ped]	2	2	7	5	3	0	0	0	0	0	0	
Radiography intravenous urography	Usually not appropriate	Limited	⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	2	2	7	2	1	1	2	1	1	0	0	
			References	Study Quality												
			6 (28461996)	4												
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	⊗⊗ 0.1-1mSv	⊗⊗ 0.03-0.3 mSv [ped]	2	2	7	2	3	1	1	0	1	0	0	
MRI abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	2	2	6	3	6	0	0	0	0	0	0	
Radiography abdomen and pelvis	Usually not appropriate		⊗⊗⊗ 1-10 mSv	⊗⊗⊗ 0.3-3 mSv [ped]	2	n/a	0	0	0	0	0	0	0	0	0	
Fluoroscopy antegrade pyelography	Usually not appropriate	Expert Consensus	⊗⊗⊗ 1-10 mSv		2	2	6	3	2	1	2	0	1	0	0	

Variant 4: Adult. Asymptomatic hydronephrosis in a pregnant patient with unknown cause. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US color Doppler kidneys and bladder retroperitoneal	Usually appropriate	Limited	O O mSv	O O mSv [ped]	9	9	0	0	0	0	0	0	3	4	8
		References		Study Quality											
		5 (33754607)		4											
		17 (30853305)		4											
		4 (23455540)		3											
		43 (33328069)		4											
US abdomen	May be appropriate	Expert Consensus	O O mSv	O O mSv [ped]	6	6	0	0	0	1	3	7	4	0	0
MRI abdomen and pelvis without IV contrast	May be appropriate (Disagreement)	Expert Opinion	O O mSv	O O mSv [ped]	5	5	1	0	3	4	5	0	2	0	0
MRU without IV contrast	May be appropriate	Limited	O O mSv	O O mSv [ped]	5	5	0	1	0	1	10	1	2	0	0
		References		Study Quality											
		15 (20729416)		4											
MRI abdomen without IV contrast	Usually not appropriate	Expert Consensus	O O mSv	O O mSv [ped]	2	2	6	7	1	0	0	0	1	0	0
DTPA renal scan	Usually not appropriate	Strong	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	2	2	6	2	2	3	1	1	0	0	0
		References		Study Quality											
		13 (31237781)		2											
		12 (8917195)		4											
		11 (24591488)		4											
		10 (25444983)		2											
MAG3 renal scan	Usually not appropriate	Limited	☹☹☹ 1-10 mSv	☹☹☹ 0.3-3 mSv [ped]	2	2	5	3	2	3	1	1	0	0	0
		References		Study Quality											

		10 (25444983)			2											
		11 (24591488)			4											
CT abdomen with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	0	4	0	0	1	0	0	0	
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	10	1	3	0	0	1	0	0	0	
CT abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	10	1	3	0	0	1	0	0	0	
CT abdomen and pelvis with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	9	1	2	2	0	1	0	0	0	
CT abdomen and pelvis without IV contrast	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	9	0	3	2	0	1	0	0	0	
CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	9	1	2	2	0	1	0	0	0	
CTU without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	9	1	2	1	1	1	0	0	0	
Radiography intravenous urography	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	10	1	2	1	1	0	0	0	0	
		References			Study Quality											
		6 (28461996)			4											
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☼☼ 0.1-1mSv	☼☼ 0.03-0.3 mSv [ped]	1	1	11	1	2	0	0	1	0	0	0	
MRI abdomen without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	1	1	10	2	0	1	0	1	1	0	0	
		References			Study Quality											

		42 (31429682)			4													
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	9	2	1	1	0	0	2	0	0			
		References			Study Quality													
		42 (31429682)			4													
MRU without and with IV contrast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	1	1	12	3	0	0	0	0	0	0	0			
		References			Study Quality													
		42 (31429682)			4													
Radiography abdomen and pelvis	Usually not appropriate		☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0			
Fluoroscopy antegrade pyelography	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	11	1	2	0	0	1	0	0	0			

Variant 5: Adult. Symptomatic hydronephrosis in a pregnant patient with unknown cause. Initial imaging.

Procedure	Appropriateness Category	SOE	Adults RRL	Peds RRL	Rating	Median	Final Tabulations								
							1	2	3	4	5	6	7	8	9
US color Doppler kidneys and bladder retroperitoneal	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	1	1	1	2	10
		References		Study Quality											
		49 (32666258)		3											
		48 (27231677)		4											
		47 (26941870)		3											
		46 (24496359)		3											
		45 (34515254)		3											
		43 (33328069)		4											
		17 (30853305)		4											
		9 (28516385)		4											
		6 (28461996)		4											

CT abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	2	2	7	3	3	0	0	1	1	0	0
		References	Study Quality												
		6 (28461996)	4												
		17 (30853305)	4												
CTU without and with IV contrast	Usually not appropriate	Limited	☢☢☢☢ 10-30 mSv	☢☢☢☢☢ 10-30 mSv [ped]	2	2	5	4	3	1	0	1	1	0	0
		References	Study Quality												
		6 (28461996)	4												
		17 (30853305)	4												
MRI abdomen without IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	2	2	4	6	4	0	0	0	1	0	0
		References	Study Quality												
		17 (30853305)	4												
MRU without and with IV contrast	Usually not appropriate	Limited	0 0 mSv	0 0 mSv [ped]	2	2	7	4	1	1	0	0	2	0	0
		References	Study Quality												
		42 (31429682)	4												
MAG3 renal scan	Usually not appropriate	Limited	☢☢☢ 1-10 mSv	☢☢☢ 0.3-3 mSv [ped]	2	2	5	3	6	1	0	0	0	0	0
		References	Study Quality												
		10 (25444983)	2												
		11 (24591488)	4												
CT abdomen with IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	9	2	3	0	0	1	0	0	0
CT abdomen without IV contrast	Usually not appropriate	Expert Consensus	☢☢☢ 1-10 mSv	☢☢☢☢ 3-10 mSv [ped]	1	1	9	2	3	0	0	1	0	0	0

CT abdomen without and with IV contrast	Usually not appropriate	Expert Consensus	☼☼☼☼ 10-30 mSv	☼☼☼☼☼ 10-30 mSv [ped]	1	1	9	2	3	0	0	1	0	0	0
CT abdomen and pelvis with IV contrast	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼☼ 3-10 mSv [ped]	1	1	8	1	4	1	0	1	0	0	0
		References		Study Quality											
		6 (28461996)		4											
		17 (30853305)		4											
Radiography intravenous urography	Usually not appropriate	Limited	☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	1	11	1	1	1	1	0	0	0	0
		References		Study Quality											
		6 (28461996)		4											
Fluoroscopy voiding cystourethrography	Usually not appropriate	Expert Consensus	☼☼ 0.1-1mSv	☼☼ 0.03-0.3 mSv [ped]	1	1	11	1	2	0	0	1	0	0	0
MRI abdomen without and with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	11	3	1	0	0	0	0	0	0
		References		Study Quality											
		42 (31429682)		4											
MRI abdomen and pelvis without and with IV contrast	Usually not appropriate	Limited	○ 0 mSv	○ 0 mSv [ped]	1	1	10	3	2	0	0	0	0	0	0
		References		Study Quality											
		42 (31429682)		4											
Radiography abdomen and pelvis	Usually not appropriate		☼☼☼ 1-10 mSv	☼☼☼ 0.3-3 mSv [ped]	1	n/a	0	0	0	0	0	0	0	0	0
Fluoroscopy antegrade pyelography	Usually not appropriate	Expert Consensus	☼☼☼ 1-10 mSv		1	1	10	1	3	0	0	1	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.